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Experimental observation of vibrations produced by pulsed laser beam in MgO:57Fe

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Abstract

We report the first observation of a laser-produced vibration with the aid of Mössbauer techniques. Thin platelets of MgO single crystals were doped by diffusion of 57Fe atoms. The illumination of the MgO: 57Fe sample with a pulsed Nd:YAG laser produced a significant broadening of the Mössbauer spectrum. In order to find out what caused these changes, we performed a series of time-domain experiments, in which the Mössbauer spectra were collected only during a 2.5 μs gate interval. This gate interval was swept from 5 μs to 190 μs over the time interval between the two laser pulses. After laser irradiation, the position of the Mössbauer line was found to be changing in time as a decaying oscillations of well-defined frequency, which can be due to the vibration of the sample induced by the laser pulse. © 2006 Springer Science+Business Media, Inc.

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Keywords

MgO:57Fe, Mössbauer spectroscopy, Pulsed laser beam